Math 116 Section 04

Quiz 8 Name _____
August 10, 2005
Instructor: Charles Cuell Student Number _____

All solutions are to be presented on the paper in the space provided. The quiz is open book. You can discuss the problem with others and ask the TA questions.

Find the following integrals:

(1) Complete the square for $-2x^2 + 4x - 1$.

$$\begin{aligned} -2x^2 + 4x - 1 &= -2(x^2 - 2) - 1 \\ &= -2(x^2 - 2 + 1 - 1) - 1 \\ &= -2((x-1)^2 - 1) - 1 \\ &= -2(x-1)^2 + 1 \end{aligned}$$

(2) Guess a factor and write the following as a product of a linear term and a quadratic term: $f(x) = x^3 + x^2 + x + 1$. By guessing easy numbers, we see that $f(-1) = 0$ so that $x - (-1) = x + 1$ is a factor. Use polynomial division to get the other factor as $x^2 + 1$. Therefore, $f(x) = (x+1)(x^2+1)$.

(3) Evaluate

$$\begin{aligned}\int \frac{x+4}{x^2-5x+6}\,dx &= \int \frac{x+4}{(x-3)(x-2)}\,dx \\ &= \int \left(\frac{A}{x-3}+\frac{B}{x-2}\right)\,dx \\ &= A\ln|x-3|+B\ln|x-2|+C\end{aligned}$$

where A and B satisfy

$$A(x-2)+B(x-3)=x+4$$

for all x. Choose $x=2$ to get $B(-5)=6$. So $B=-\dfrac{5}{6}$. Choose $x=3$ to get $A=7$.